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SEEING HALLEY'S COMET: A GUIDE FOR OBSERVERS IN THE NORTHERN HEMISPHERE

Halley's Comet, famous for its regular once-in-a-lifetime appearances, will be swinging through the inner solar system and be visible to casual observers in the winter and spring of 1985-86. Since the comet's last appearance was in 1910, its coming appearance will be the first when modern instruments will be used for observations. These instruments include everything from spacecraft fly-bys and observations from Earth orbit through binoculars and cameras available from department stores to the naked eyes of interested observers around the world.

Comets look like "hairy stars" as they move almost imperceptibly across the sky during the night and they can be visible for weeks or months at a time. They are not shooting stars - meteors - seen momentarily several times a night when dust particles burn up in Earth's atmosphere. Comets are believed to be huge snowballs of frozen gases mixed with dust moving in elongated orbits around the sun. As they approach the sun the frozen gases of the nucleus return to gaseous form and expand outward carrying dust with them to form the coma and head of the comet. The effects of sunlight and the solar wind blow the coma material away from the head to form dust and ion tails, distinguishable by their structure and coloring on photographs.

WHERE TO LOOK FOR THE COMET

Because of the orbital motions of the Earth and comet around the sun, this appearance of Halley's Comet will be much less spectacular than the one in 1910 or, in fact, any in the past 2000 years.

To see Halley's Comet well it will be important to observe it from an area with little pollution, haze, or dust in the air and away from city lights and moonlight. This will allow the faint, gossamer glow of the comet, like thin, moonlit clouds, to be easily seen in the sky.

The Earth's southern hemisphere is the favored viewing area for this appearance of the comet. Observers in mid-northern latitudes will see a modest display.

Figure 1 traces the path of Halley's Comet on the celestial sphere during July 1984 to November 1986. Note the comet's retrograde loops and its transition from a primarily northern hemisphere object in late 1985 to a southern hemisphere one in early 1986.

Halley's Comet will be visible in small telescopes during the autumn of 1985. In December the comet will be visible in binoculars about halfway between the horizon and zenith in the southwest at the end of evening twilight (about 1-1/2 hours after sunset). By early January 1986 the comet should be visible to the naked eye. Observers will see that it brightens rapidly and develops a tail as it approaches the sun during January. While this is occurring, it is also seen lower in the sky and more towards due west each night at the end of twilight.

Figure 2 shows the comet's position at the end of evening astronomical twilight during January. In Figures 2-4, approximate total visual magnitudes, with a smaller number implying a brighter comet, are given in parentheses following dates. Also, viewing with binoculars and ideal observing conditions are assumed.

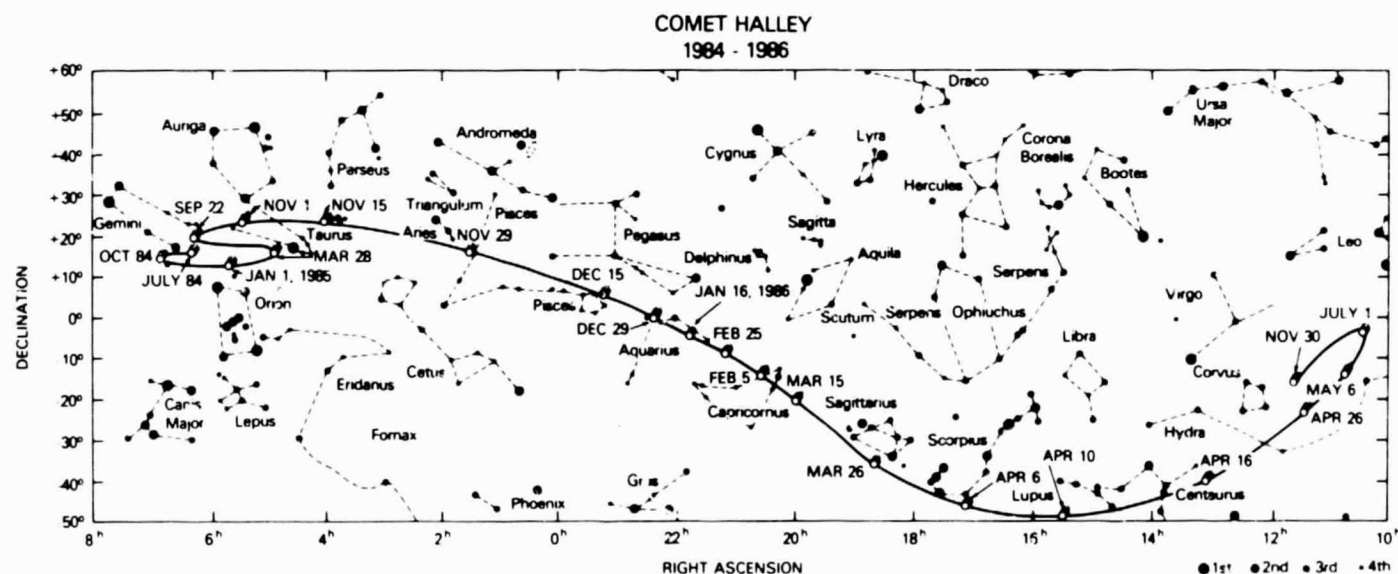


Figure 1. Comet Halley's Path on the Celestial Sphere.

By the end of January the comet is lost in the solar glare. A month later Halley has reappeared in the *morning* sky slightly south of due east and low on the horizon before the onset of morning twilight (1-1/2 hours before sunrise). The comet's tail is better developed than in January. As March progresses Halley's Comet moves higher in the sky and more towards the south, slowly brightening through the end of the month as it approaches Earth. Figure 3 plots the comet's position at the beginning of morning astronomical twilight for this period.

In late March and early April the comet is closest to Earth. Seen low in the southeast and moving further towards the south daily, the comet is now brightest and shows its greatest tail extent for this appearance. In north temperature latitudes the low al-

titude of the comet will prevent the full extent of the tail from being seen because of severe absorption of light by the Earth's atmosphere. During the second week of April the comet essentially disappears for mid-northern observers because of its extreme southern position in the sky. Figure 4 gives the comet's position at the end of evening astronomical twilight during April.

During the last half of April the comet is in the southeast after *evening* twilight, rising higher in the sky daily. The tail is decreasing in length and Halley's Comet is now approaching the limit of naked eye visibility. By May binoculars will be required to see the comet as it returns to the deep freeze of the outer solar system. It can be followed in binoculars or a small telescope for several more months.

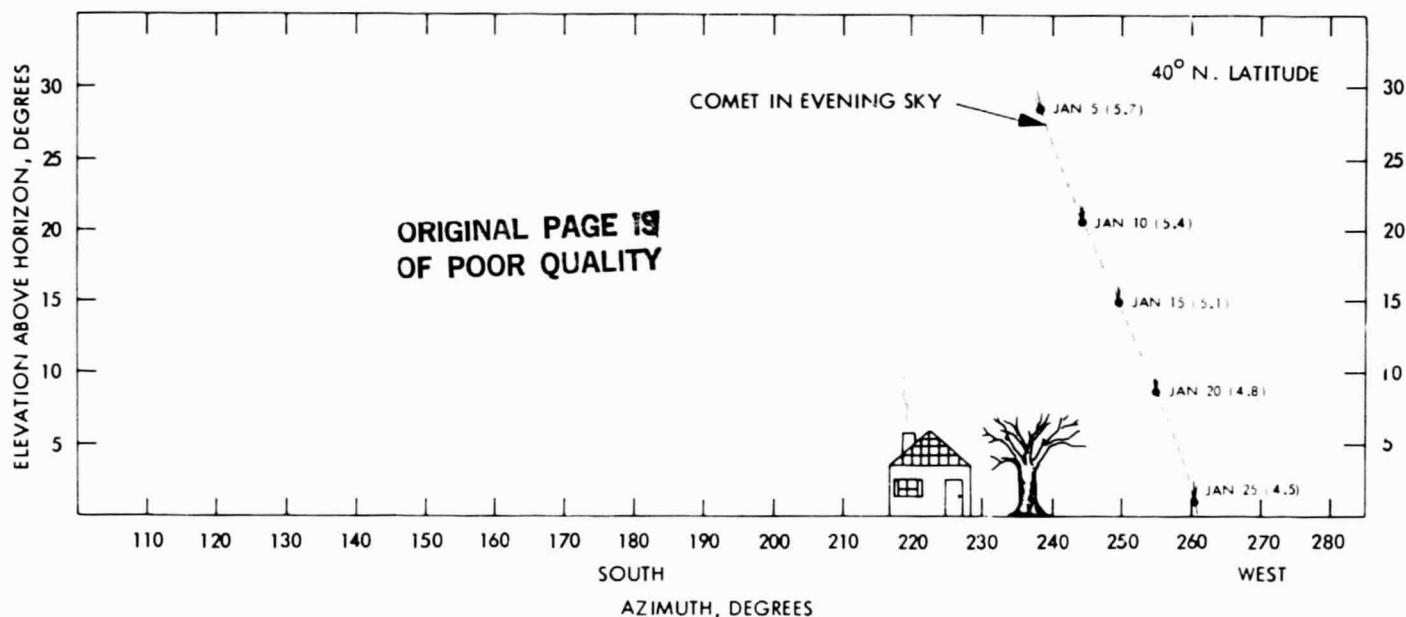


Figure 2. Comet Halley's Position During January.

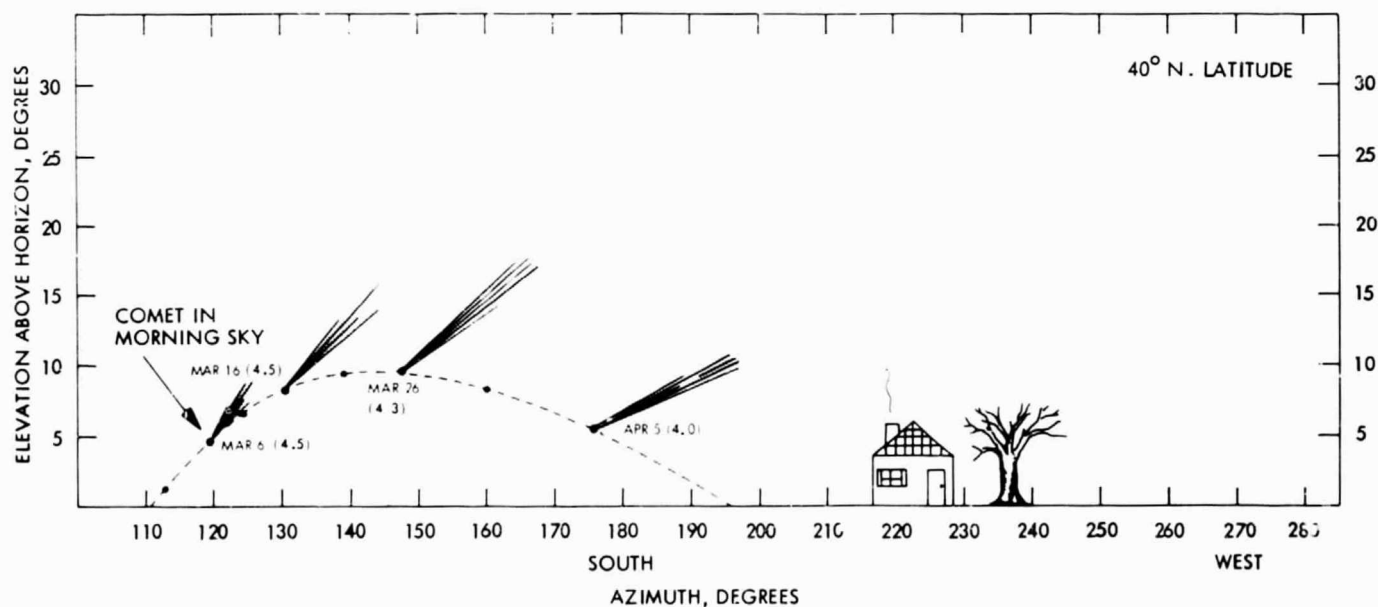


Figure 3. Comet Halley's Position During March and Early April.

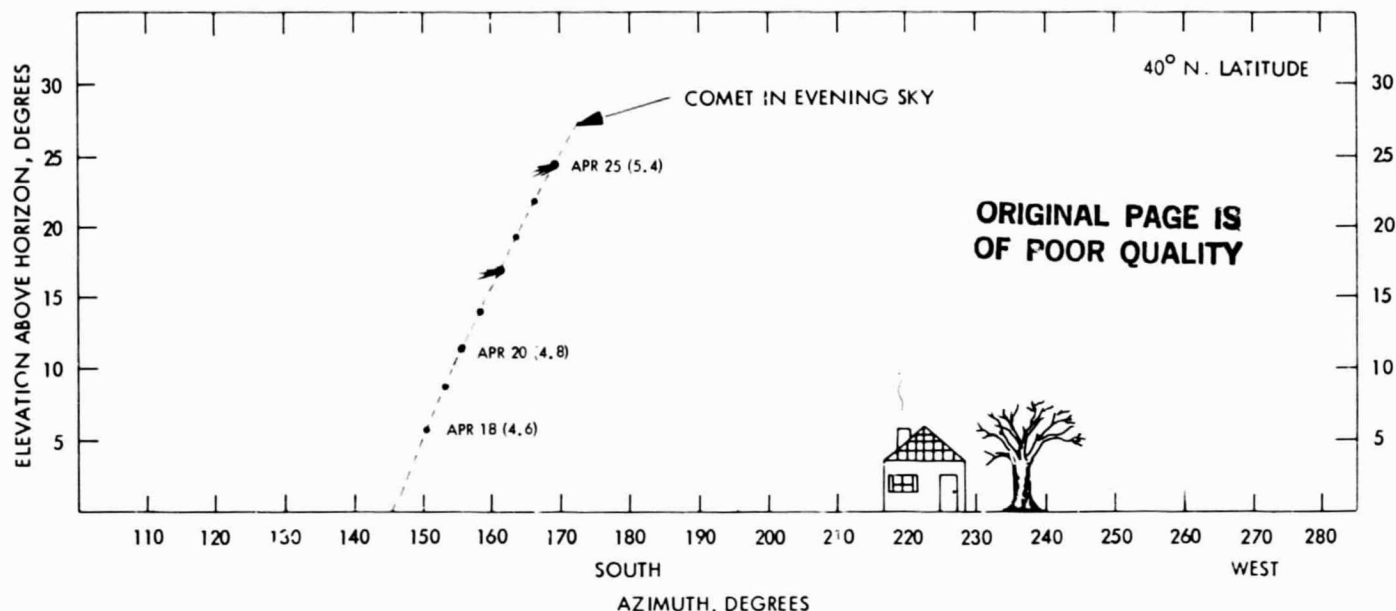


Figure 4. Comet Halley's Position During April.

HOW TO OBSERVE THE COMET

For visually observing the comet, binoculars and small telescopes or the naked eye will provide fine views of the comet, especially when used away from city lights and pollution. It is important to allow the eyes at least 10 to 20 minutes to adapt to darkness. Going from brightly lit indoors to dark outdoors and immediately looking for the comet will make it difficult to locate much less to see well. Among the many sizes and types of binoculars available, 7 x 35 and especially 7 x 50 binoculars will provide the best views. Compared to the naked eye, the greater light gathering power of binoculars will bring out the full extent of the comet but the field of view is limited by the magnification. It may be necessary to sweep the binocular field of view over the comet to see its full extent. The slow motion of the head against background stars will be apparent in a few hours time.

Well dark-adapted naked eyes will allow an observer to take in the whole comet in one look. Its motion from night to night across the sky will be easily distinguishable.

Comet photography is easily accomplished with any camera whose shutter can be locked open (most adjustable cameras have a "B" shutter setting for this purpose). Even some automatic cameras that make long duration exposures will work. Simply place the camera on a sturdy, rigid tripod. Use a cable release to open the shutter with a minimum of vibration. Exposures of 10 seconds to 10 minutes or more will show the comet on fast color and black and white films. On the film the Earth's rotation will

cause noticeable trailing of the comet and background star images with longer exposures.

Lenses with focal lengths of 28 mm to 200 mm will work well to show the comet, depending on the desired field of view. The lens should be used at the lowest f/ number possible, the lower the better.

ADDITIONAL INFORMATION

Local planetariums and astronomy clubs can supply more information on comets and astronomical photography. Other sources include:

Astronomy magazine; Astromedia Corp., P.O. Box 92788, Milwaukee, WI 53202, USA

Astrophotography Basics; Eastman Kodak Co., Department 841, Rochester, NY 14650, USA

The Comet Is Coming by Nigel Calder; The Viking Press, 625 Madison Avenue, New York, NY 10022, USA

Comets, readings from *Scientific American* edited by John C. Brandt; W. H. Freeman and Company, 660 Market Street, San Francisco, CA 94104, USA

Sky and Telescope magazine; Sky Publishing Corporation, 49 Bay State Road, Cambridge, MA 02238, USA

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